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Usage the Lazy Learning Meta-Heuristic Technique for Predicting Entrepreneurial Marketing in the Insurance Industry

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Abstract

Due to the increasing importance of marketing, entrepreneurship and the role of organizational structure in their application, the purpose of this research is to predict entrepreneurial marketing using an organizational structure in the insurance industry. For this purpose, for marketing, seven indicators and for organizational structure, three indicators are defined, then prediction of entrepreneurial marketing indicators has been done by organizational structure indicators using lazy learning algorithm. In the proposed method, after predicting each data by K vector from its closest neighbor, the algorithm database is enriched for better prediction of future data. The proposed algorithm is simulated and compared in five different modes by MATLAB software, also, three insurance (Iran, Karafarin and Parsiyan) companies are selected in Mazandaran province. In total, the statistical population in this study is 588 cases. The results of simulation indicate the proper accuracy of entrepreneurial marketing forecasting based on validation parameters MSE and NRMSD. In this research, Lazy Learning method can predict future without modeling the problem with previous information processing.

Keywords: Forecast, Entrepreneurial marketing, Organizational structure, KVNN algorithm.

1 | Introduction

An issue that has become increasingly obvious to researchers is that conventional marketing practices of the third millennium are not always appropriate. Recent studies suggest that companies should be entrepreneurial in their marketing efforts when dealing with ambiguity and uncertainty in the market [1]-[5]. Recognizing the importance of the interaction between entrepreneurship and marketing has led to the suggestion of the entrepreneurial marketing concept [6]-[8]. Entrepreneurial marketing has been described as responding to the market and having an inherent ability to predict changes in customer demand [9]-[11]. Entrepreneurial marketing is the active identification and exploitation of opportunities to acquire and retain profitable clients through innovative approaches to risk management, leverage of resources, and value creation [7] and [8].

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The concept of entrepreneurial marketing is an integrated framework that includes a series of marketing activities that companies may employ, which has seven main dimensions. Four of these dimensions are forecasting, focusing on opportunity, accepting computational risk, and innovation, which measures the entrepreneurial attitude of the company as well as paying attention to the customer, leveraging resources, and creating value. These seven dimensions are described as a chain with the possibility of emphasis from less to greater within the organization [12]-[16].

Traditional marketing may not be appropriate for companies that compete in this highly dynamic business environment. Recent studies suggest that companies should be more entrepreneurial in their marketing when dealing with ambiguity and uncertainty in the market [2], [3] and [5]. A growing collection of evidence suggests that more successful companies over time are those that are engaged in entrepreneurial activities at a higher level [17]. This form of marketing is a tendency to be responsive and reactive to opportunistic competition in the environment. Empirical evidence suggests that there is a significant relationship between the marketing of a company and its entrepreneurial orientation, and they are both widely responsible for the success of the company [7] and [8]. By combining the two predefined domains, the term "entrepreneurial marketing" is used to describe the marketing process of companies pursuing opportunities in uncertain market conditions, often under conditions of compulsory resources. Entrepreneurial marketing has been considered as a coherent structure for marketing conception in the era of change, complexity, chaos, contradiction, and resource reduction; in this case, entrepreneurial marketing as an integrated concept combines strategic marketing operations with entrepreneurial aspects in a comprehensive construction [9] and [11].

The business environment is competitive for business enterprises. The ability in manufacturing companies is directly related to the ability to respond to rapid changes in the market. They try to capture these capabilities through the integration of all processes in the chain and concepts such as timely production. Many researchers have contributed to the development of some production scheduling methods and terminology, and the supply chain has been integrated among supply chain members [18].

Because of the degree of the industrial competitiveness of insurance due to the current situation and changes and developments that have occurred in businesses, especially online businesses, and also on the other hand, the degree of consumer desire for some types of insurance is less. Therefore, we need stronger forecasting models so that we can perform the correct forecasting process in the field of innovative activities. We in the insurance industry seek to predict these activities based on components that have already been identified, but the gap in this regard is that so far the research and studies conducted in this field are with a separate approach, ie Marketing and Entrepreneurship are researched separately. Few kinds of research on entrepreneurial marketing in the insurance industry have been conducted. Also, the use of quantitative models for measurement and forecasting is very limited and forecasting has not been done in this way. Traditional forecasting methods are usually based on mathematical methods such as regression, and with the spread of science related to artificial intelligence and the importance of data in today's world, data science has developed significantly and various powerful algorithms such as Lazy were introduced. One of the newest methods is the Lazy, KVNN algorithm which has tremendous power in accurately predicting the future. Therefore, in this article, the goal is to predict entrepreneurial marketing by organizational structure indicators using a lazy learning algorithm. The structure of the present paper is followed by a review of the literature on the subject and the KVNN algorithm is explained. Then, the prediction of seven entrepreneurial marketing indicators based on the three organizational structure indicators was studied by the KVNN learning algorithm. Finally the results of the study are presented.

2 | Literature Review

In this section, we will first express entrepreneurial marketing and then its main components will be explained, and at the end of the theoretical literature, we will discuss lazy learning and K-Vector Nearest Neighborhood (K-VNN) method.

2.1 | Entrepreneurial Marketing

Propose that the marketing of small companies because of their entrepreneurial properties is in fact a different style, characterized by a wide variety of inherently informal factors, simple and random number [19]-[23]. This form of marketing tends to respond to competitiveness and opportunism [11], high reliance on networking [17], and opportunities created through social capital [17].
In light of these observations, entrepreneurial marketing as "actively identifying and exploiting opportunities to reach and retain profitable customers through innovative approaches to risk management, value creation and resource leverage". They view entrepreneurial marketing behavior as stemming from factors such as entrepreneurial thinking, innovation, risk-taking, action, and opportunism [24] and [25].

State that marketing is a special advantage for a small company and suggests a close relationship between the entrepreneur and the customer [26].

Long-term customer-entrepreneur relationships enhance the ability of small companies to respond quickly to customer needs and provide greater flexibility to respond to customer needs [20] and [22], with a profound approach to entrepreneurial marketing that is based on entrepreneurial characteristics.

In this case, marketing and entrepreneurship share three things: they are both focused on change, opportunistic in nature, and innovative in their approach. Seven main dimensions of entrepreneurial marketing: opportunism, predictability, innovation, customer attention, risk management, resource leverage, and value creation [25].

2.2 | Predictability

Foresight is a behavioral and personal construct that indicates a relatively stable tendency to influence environmental change. Predictability is described as taking actions to influence the corporate environment. Entering into two related marketing activities, organizational predictability involves the activity whereby the company anticipates challenging environments and takes action to respond to these events. From an entrepreneurial approach, foresight describes the marketing activities through which the company redefines its external conditions to reduce uncertainty, vulnerability and dependency [14], [15] and [16].

2.3 | Opportunism

Identifying and pursuing opportunities for entrepreneurship is a fundamental factor and a key aspect of entrepreneurial marketing. Opportunism needs market opportunities that are not addressed and are a potential source of sustained profit. They arise from market failures where knowledge of these vulnerabilities and how to exploit them identify entrepreneurial marketing. Entrepreneurial marketing is essentially an opportunistic and opportunistic way of thinking and acting. This marketing approach differs in that it returns principles to its foundations as creative pursuits and as art. Thus, imagination, vigilance, and authenticity are associated with the entrepreneurial behaviors that are at the heart of this marketing concept, and these attributes apply to a wide range of marketing activities, from market research and segmentation to marketing management [27].

2.4 | Risk Acceptance

Companies that embrace the entrepreneurial marketing process are not gamblers but risk-takers who understand that innovation in this social, technological and economic environment is inherently variable and needs rationalization. One way to manage risk happens in alliance with other groups, which these companies believe can both have the ability to define and help to transmit the risk to innovation orientation [17].

2.5 | Inovation Orientation

An entrepreneur as an innovator or developer who recognizes and exploits opportunities, transforming those opportunities into viable and marketable ideas. Over time, it creates value, and considers the risk of a competitive market for implementing these ideas and understands the rewards of these efforts [28].

2.6 | The Intensity of Customer Attention

Customer orientation is a philosophy and a set of behaviors that help determine and understand the needs of target customers to respond better to competitors. Companies that use the entrepreneurial marketing process effectively recognize that their business is the cause of current customers. However, these companies also have a deep understanding that the product space, market and technology in which they operate is dynamic, resulting in customers becoming discouraged from current products and often lured into superior and newly developed products. Therefore, not only do such companies need to work closely with existing customers to ensure the competitiveness of the products offered, but they also need to continually identify new customers, look for new needs for accountability, and even create space for product- market - new technology [17].

2.7 | Leveraging Resources

All agents must seek additional resources to implement their programs more effectively. These resources include money, people, contributions, or equipment. Assets are needed to accomplish an organization's goals and objectives, including physical resources (buildings, tools and materials), financial resources (money and budget flow), social resources (norms, common sense, and inherent trust in strong relationships) and intellectual resources (skills, knowledge and competence of shareholders). Leveraging resources combines existing and new resources to achieve the goal of increasing growth and high productivity from what is available. To leverage resources we need to engage stakeholders in different ways, engage all relevant stakeholders, identify goals of collaborative efforts, develop strong relationships with others, develop a strategic plan, raise quality standards, leverage physical, financial, social and intellectual resources, and identify potential assets [29]-[32].

2.8 | Lazy Learning

The lazy learning approach estimates the unknown function by searching on the region around the query point. The approximation is required around this point. All examples from a system in a database are stored in this algorithm. Then the query point is approximated by selecting the parts of the data that belong to a small neighborhood around the query point. The lazy learning algorithm is represented in the following part to illustrate how it is implemented for the expansion.

Considering an unknown nonlinear mapping $f: R^m \rightarrow R$, in which a set of N examples $\{(\phi_i, y_{i=1})\}_{i=1}^{N}, \phi_i = [x_{i1}, x_{i2}, \dots \dots, x_{im}]^T is$ stored. At a specific query point ϕ_q, whose components are similar to those defined for ϕ_i, the estimation of value $y_q = f(\phi_q)$ is achieved by [33] and [34].

$$\widehat{y}_q = \phi_q{}^T \widehat{\beta}. \quad (1)$$

2.9 | K-Vector Nearest Neighborhood (K-VNN) Method

The parameter β of the local linear model, which estimates the unknown nonlinear mapping f in a neighbor of ϕ_q can be generated by solving the local linear regression.

By applying the principles of the above algorithm, we assume that the controlled available system can use the Nonlinear Autoregressive Exogenous (NARX) model to represent as follows:

$$y(t) = f\left(\phi(t-1)\right) + \epsilon(t). \tag{2}$$

Where $\phi(t-1) = \left[y(t-1), \dots, y\left(t-n_y\right), u(t-p), \dots, u(t-p-n_u)\right]^T$. This is system state vector in the moment. $y(t), \epsilon(t), u(t)$ are respectively the system outputs, the zero mean white noise and the system input.

For *Eq. (3)*, the physical description of the controlled system is not certain, assuming that there are N sets of input and output data $\left\{y(i), \phi(i)\right\}_{i=1}^{N}$, at the current time t. K-VNN strategy searches in the N sets of data to find the most identical data (K<< N), specific as follows:

I. When $cos\left(\phi(i), \phi(t)\right) < 0$, we have an opinion $\phi(i)$ diverge from the current input $\phi(t)$, which is undesirable for system modeling, so we should give up the data;

$$\begin{cases} D\left(\phi_i, \phi_q\right) = \alpha\, e^{-d\left(\phi_i, \phi_q\right)} + (1-\alpha)\cos\left(\phi_i, \phi_q\right) & \alpha \in [0, 1] \\ d\left(\phi_i, \phi_q\right) = \sqrt{\sum_{l=1}^{m} (x_{i,l} - x_{q,l})^2} \end{cases}. \tag{3}$$

II. Otherwise, the function of the distance $\phi(i)$ and $\phi(t)$ sum with the weighted angle cosine:

So in the existing data information, K-VNN selects the largest k set data values D(×), in descending order, made learning sets:

$$\begin{aligned} &\left\{\left(y(1), \phi(1)\right), \left(y(2), \phi(2)\right), \dots, \left(y(k), \phi(k)\right)\right\}, \\ &D\left(\phi(1), \phi(t)\right) > D\left(\phi(2), \phi(t)\right) > \cdots > D\left(\phi(k), \phi(t)\right). \end{aligned} \tag{4}$$

The control system estimates the local linear model with current conditions, using the linear regression. However, at other operation points, the density might differ using the current information vector $\phi(t)$. The quantitative characteristics of used data in modeling is also uncertain. For instance, the numbers of used neighbors to get the best linear model $\hat{\beta}$ is not certain, the number of calculation, or the neighborhood range $k \in [k_m, k_M]$. In order to calculate $\hat{\beta}_{k+1}$ of the neighboring k +1, the model values $\hat{\beta}$ of the neighbor k and the recursive least squares method are used.

$$\begin{cases} v(k+1) = v(k) - \dfrac{v(k)\,\phi_{k+1}(j)\,D_{k+1}\,\phi_{k+1}(j)^T v(k)}{1 + D_{k+1}\,\phi_{k+1}(j)^T v(k)\phi_{k+1}(j)}, \\ \gamma(k+1) = v(k+1)\phi_{k+1}(j)D_{k+1}, \\ e(k+1) = Y_{k+1}(j) - \phi_{k+1}(j)^T\hat{\beta}(k), \\ \hat{\beta}(k+1) = \hat{\beta}(k) + \gamma(k+1)e(k+1). \end{cases} \tag{5}$$

Higher values of Dk+1 reflect greater contributions to the recursive identification. This approach is linked with the principle of the recursive least square algorithm.

$$\left\{e_i^{loo}(k+1) = \frac{Y_i(j) - \phi_i(j)^T\hat{\beta}(k+1)}{1 - \phi_i(j)^T v(k+1)\phi_i(j)}\right\}_{j=1}^{k+1}. \tag{6}$$

$e_i^{loo}(k+1)$ refers to the estimated error between $Y_i(j)$ and the approximated value. It chooses the i^{th} example out of the subset. The model characterized in *Eq. (6)* is considered as a by-product, which gives all the required components for the calculation of the leave-one-out errors calculations. The leave-one-out errors is achieved without the need of any other identification and validation of the model. The leave-one-out cross-validation error set is obtained as shown in *Eq. (8)*, which is obtained from *Eq. (7)*.

$$e^{loo}(k+1) = \left\{e_i^{loo}(k+1)\right\}_{j=1}^{k+1}, \quad k+1 \le k_{max}. \tag{7}$$

It includes all the leave-one-out errors associated with the model specified with the k+1 vector nearest neighbors. The cross-validation is characterized by the square error term in *Eq. (9)*.

$$MSE^{loo}(k+1) = \frac{\sum_{i=1}^{k+1} D_i \left(e_i^{loo}(k+1)\right)^2}{\left(\sum_{i=1}^{k+1} D_i\right)}. \quad (8)$$

The modeling procedure is formulated by *Eqs. (6)* to *(9)*. The line models $\hat{\beta}(k)$ and prediction $\hat{y}_k$ is linked with the respective cross-validation mean square error $MSE^{loo}(k)$. It is determined within the range k_{min} and k_{max}. The Winner-Takes-All technique is implemented to choose the best model and to predict ϕ_q. It is explained as follows:

$$MSE^{loo}(k+1) > MSE^{loo}(k) \ , \ k+1 \in [k_{min} \ , k_{max}] . \quad (8)$$

In the recursive identification procedure, the new $\hat{\beta}(k+1)$ is significantly worse than the last $\hat{\beta}(k)$, and ends after their cursive procedures. On the other hand, add the new example from a *Eq. (5)*. The parameter $\hat{\beta}$ and the error term MSElOO are evaluated by using *Eqs. (6)* and *(10)*, until k = kmax [33]. This cross-validation procedure will result from the best line local model in time. It can be considered as a terminated condition in the recursive *Eq. (6)*.

The criterion $\{D_i\}_{i=1}^{k_{max}}$ can be taken into account as an updating condition for adding the 'new' example to the existing database. When the $\{D_i\}_{i=1}^{k_{max}}$ values are available, we can achieve the updating strategy without any additional complex computations. The updating strategy is described as follows [34]:

The portions of the database $\{D_i\}_{i=1}^{k_{max}}$ are calculated by using *Eqs. (4)* and *(5)*. The current query can be followed through the following three conditions:

I. If $D_1 = 1$, the query ϕ_q is totally superposition to $\phi_q(j)$ and should not be added to the database.
II. If $D_1 < 1$ and $D_\rho > \delta$, *($\rho < k_{max}$)*, the density around the query ϕ_q is high enough and the query point can be rejected.
III. Else, the query ϕ_q can be dealt with as a 'new' example and can be added to the existing database. Can be regarded as a 'new' example and added to the database.

3 | Research Background

The study and analysis of the background of the research topic show the expansion of studies in this field, but it should be noted that in the current research, which is the use of meta- Heuristic techniques in marketing and entrepreneurship, little research has been done. In this regard, the following researches can be mentioned: Sahid and Hamid [2] entitled how to strategize capabilities via entrepreneurial marketing approaches that the purpose of this paper is to suggest strategies that will help in enhancing SME's capabilities through the entrepreneurial marketing approaches.

Bandara et al. [3] entitled entrepreneurial marketing of small and medium scale enterprises in a selected divisional secretariat division of Sri Lanka that the aim of this study was to explore the Entrepreneurial Marketing approach adopted by Small and Medium Scale Enterprises (SMEs) in a selected divisional secretariat division of Sri Lanka. Results also revealed that there is a significant relationship between business size, business age and education level of the business operator and the level of adoption of EM. Verij Kazemi et al. [34] entitled adaptive frequency control with variable speed wind turbines using data-driven method, in order to control the frequency of the power grid; it used the KVNN algorithm to predict the frequency of the power grid in the future. Then Verij Kazemi et al. [33] in an article entitled adaptive fractional-order control of power system frequency in the presence of wind turbine by predicting the power frequency using past data and Lazy algorithm, it was able to prevent network frequency fluctuations [34].

4 | Methodology

The present study is both practical and correlation methods. The realm of this research is state and private insurance firms in the province of Mazandaran. In the meantime, the only state insurance firm is Iran insurance in the country, which has 10 branches and 381 representatives in the province. Among the private insurances, two insurances, Entrepreneur and Parsian Insurance, have been selected. The reason for choosing these two options is that they are based on studies and the available statistics are the most active in terms of entrepreneurial activities, as well as special emphasis on studies and programs. Strategic planning and insurance instrumentation, creation and development of information technology and try to use the latest insurance software and the latest computer technology available, all the expected insurance coverage with accuracy, quality and speed of supply show. Karafarin Insurance has 2 branches and 72 representatives and Parsian insurance have 5 branches and 118 agents. Therefore, the statistical population in this study is 588 cases.

Table 1. Validity and reliability results of the questionnaire by variables.

Structure	Cronbach's alpha	Dimensions	Cronbach's alpha	Item	Factor load
Entrepreneurial Marketing	0.813	Predictability	0.863	1	0.934
				2	0.829
				3	0.902
		Opportunism	0.720	4	-0.239
				5	0.606
				6	0.913
		Risk Acceptance	0.783	7	0.866
				8	0.860
				9	0.775
		Innovationism	0.787	10	0.816
				11	0.865
				12	0.822
		Intensity of customer attention	0.787	13	0.852
				14	0.917
				15	0.751
		Leveraging resources	0.719	16	-0.058
				17	0.532
				18	0.592
				19	-0.685
		Create value	0.818	20	0.342
				21	0.138
				22	0.817
				23	0.772
				24	0.536
				25	0.866
				26	0.777
		Complexity	0.701	1	0.756
				2	0.716
				3	0.695
				4	-0.560
				5	-0.297
				6	-0.533
				7	0.732

Table 1. (Continued).

Structure	Cronbach's alpha	Dimensions	Cronbach's alpha	Item	Factor load
		Official	0.726	8	0.722
				9	0.751
				10	-0.676
				11	-0.730
				12	-0.671
				13	0.643
				14	0.628
		Focus	0.78	15	0.582
				16	-0.21
				17	0.708
				18	0.674
				19	-0.231
				20	0.065
				21	-0.084
				22	0.709
				23	0.704
				24	0.613

The Israel table has been used in this study in order to determine the sample size. At a 5% error rate, with a statistical population of 588, the sample is 240, and the researcher uses a multi-stage cluster sampling method to collect data. For this purpose, Mazandaran province has been divided into three main parts of the West (from Ramsar to Noshahr), the center (Noor-Mahmoudabad) and the East (from Amol to Galogah) and after the lottery of the cities of Tonekabon, Chalous, Noor, Babol and Sari and about 43% of the questionnaires collected from the branches of western Mazandaran while 38% were from the east of the province, and the researcher made a questionnaire was distributed to each of insurance branches of Iran, Karafarin, and Parsian in these areas. In this research, two questionnaires were used to collect data. The first questionnaire is about entrepreneurial marketing, which consists of 7 dimensions and 26 questions that are derived from the research. The second questionnaire is to measure the organizational structure derived from Robbins's standard questionnaire (1987), which has three dimensions and 24 questions.

In order to assess the validity of the questionnaire, a confirmatory factor analysis using PLS software was split into two questionnaires, an acceptable value of 0.3, and a factor load for questions that were less than this amount were removed. The reliability of the Cronbach's alpha was measured using the PLS software and considering that all values are higher than 0.7, so it has the necessary validity and is acceptable, the results of which are shown in *Table 1*.

5 | Findings

5.1 | Validation Process Training Algorithm

For validating each predictive algorithm, there are different methods, the most important of which are described in the following *Table 2*. Each of the six parameters listed in the table above varies from zero to infinity, and the less they are, the more credible and the better the prediction algorithm performs. Most of the parameters presented in *Table 2* are interdependent. Therefore, in order to understand the validity of the prediction algorithm in each case, we choose two parameters of mean squared error and the normal root mean square deviation, which contains different information of each other. In this research, a total of 588 questionnaires were distributed among 3 insurance companies, Karafarin, Persian and Iran insurance companies in accordance with the following *Table 3*.

The accuracy of the predictions and their accuracy depend entirely on the data used in this prediction. Usually, the more varied the data used for forecasting and the more space they cover, the more accurate.

Table 2. Predictive algorithm validation methods.

Validation Criteria	English Equivalent
Sum of Squares Error	SSE
Mean Squares Error	MSE
Root Mean Square Error	RMSE
Mean Absolute Error	MAE
Normalized Root-Mean-Square Deviation	NRMSD
Coefficient Variation Root Mean Square Deviation	CVRMSD

Table 3. Questionnaires distributed in the insurance branch.

	Insurance Name	Branch Number	Representation Number	Total Number of Questionnaires Distributed
Private	Karafarin	2	72	74
	Parsian	5	118	123
Governmental	Iran	10	381	391
Total		17	571	588

The predictions will be. In this study, prediction was made using five different types of information. In the first three cases, data banks of the questionnaires of each of the insurance companies, Karafarin, Parsian and Iran were investigated individually. Then, in the fourth case, the total information of Karafarin and Parsian private companies were used for the training of the KVNN algorithm.

Finally, all information from private and public health insurance questionnaires has been used for forecasting. In testing different prediction algorithms, if all the data is used for training and then the trained data is used to test the prediction algorithm, the algorithms that have been wrongly trained but have the power to retain the data will get a high score. However, as soon as they encounter new data, they have a large error in forecasting, so a large part of the data is always used for training and a smaller part is used to test forecasting algorithms. In each of the above 5 modes, 85% of the information for training and 15% for the verification of the KVNN algorithm has been tested. As shown in the table below, most in the fifth position, where all the insurance information is used for training and forecasting, the validation parameters of MSE and NRMSD are the highest, that is, the private and state-owned private insurance structures are somewhat different. Combining them together makes it hard to model them.

As we see in *Table 4*, based on the MSE validation parameter, the prediction index in all the intended insurance has the lowest value, namely the prediction of the entrepreneurial marketing forecasting index based on the three parameters of "decentralization", "Formalism" and "complexity" of the organizational structure is performed with the best accuracy.

Based on the NRMSD validation parameter, in the entrepreneurial insurance, the predictive index is the lowest of the predictive value of the entrepreneurial marketing forecasting index based on the three parameters of the organizational structure with the best accuracy. In the Persian insurance, the innovation index is the least predictive value of this Indicator with the most accuracy and in Iranian insurance, which is the only state insurance company, risk taking is the least amount and this index of entrepreneurial marketing based on the three parameters of organizational structure is done with the best accuracy.

In all of the listed insurance, the seventh (value-added) index has the highest MSE, NRMSD. That is, the forecast of the "value-added" indicator is based on the three parameters of "decentralization", "formalization" and "complexity" of the organizational structure with the least accuracy.

Table 4. Predicting entrepreneurial marketing indexes and organizational structure with proposed algorithm in five different databases.

Index of Entrepreneurial Marketing / Training Model	validation Parameter	Opportunism	Predictability	Risk Acceptance	Innovationism	Customerism	Leveraging resources	Leveraging resources
KVNN Training Based on Karafarin Insurance Database	MSE	0.332	0.305	0.389	0.402	0.315	0.385	0.411
	NRMSD	0.853	0.825	0.872	0.913	0.879	0.910	0.923
KVNN Training Based on Parsian Insurance Database	MSE	0.369	0.328	0.356	0.329	0.352	0.333	0.401
	NRMSD	0.8613	0.855	0.869	0.796	0.869	0.872	0.923
KVNN Training Based on Iran Insurance Database	MSE	0.396	0.310	0.389	0.319	0.349	0.355	0.398
	NRMSD	0.823	0.782	0.753	0.841	0.886	0.856	0.932
KVNN Training Based on Private Insurance Database	MSE	0.358	0.327	0.330	0.357	0.334	0.365	0.402
	NRMSD	0.863	0.823	0.791	0.901	0.812	0.825	0.921
KVNN Training on All Insurance Databases	MSE	0.385	0.362	0.388	0.378	0.386	0.371	0.421
	NRMSD	0.901	0.785	0.852	0.896	0.859	0.921	0.932

6 | Discussion and Conclusion

This research is entitled "Designing a Model for the Entrepreneurship Marketing Forecasting in the Insurance Industry Using the Lazy Learning" technique. The reason for using this algorithm is that it is easier and faster than other existing algorithms, as well as in Considering two aspects of angle and size, and forming a vector for data and weighting them, which are used to market seven indicators of forecasting, opportunism, acceptance of computational risk, innovation, attention to customers, leverage of resources and creation of value. For the organizational structure, three indicators of formalism, complexity and decentralization are defined. The K-VNN algorithm is proposed to predict the entrepreneurial marketing index by organizational structure indicators. In order to evaluate the efficiency of the proposed method, Matlab software is used for simulation.

Comparing the above-mentioned modes shows that data categorization in two categories of private and public insurance creates the best database for prediction. This is due to the richness of databases and the proximity of their behavior in these banks. In government insurance, the value-added index of entrepreneurial marketing in both the MSE and NRMSD perimeter has the highest value, so it has the least accuracy in predicting based on the three parameters of organizational structure. However, with the highest accuracy in predicting entrepreneurial marketing variables based on the three parameters of formalization, complexity and decentralization of organizational structure, it can be said that in MSE parameter validation, the prediction index in all insurance firms has the lowest value. In NRMSD Parameter Validation, the prediction index in Karafarin Insurance, and the innovation index in Parsian Insurance, and the risk index in Iranian Insurance can be mentioned.

Comparison of the research findings with some of the findings of other researchers in the field of entrepreneurial marketing and Meta-Heuristic algorithm, shows the alignment of the results as follows:

In his article, Verij Kazemi et al. [33] has used a lazy algorithm for classification, clustering and forecasting, which is a powerful and simple method. The capability of this algorithm and its accurate forecasting power as well as its high computing speed in online control methods have been proven in this article and the network frequency control has been done online with the help of lazy algorithm; therefore, in the present paper, since accurate calculations are expected, this method has been used for clustering. Sahid the result of this research is to reach a structural model that the components of this model include: opportunity creation, resource enhancement, risk management, customer intimacy-based

innovative products, legitimacy, market orientation, growth orientation and informal marketing research. Compared to the present study, the mentioned components have acted in the same way in some components such as opportunism, risk acceptance and intensity of customer attention. Further, as per the finding's Bandara, the overall EM and three EM dimensions (value creation, proactiveness and innovativeness) has a positive correlation with the sales growth of the business and in comparison with the present study, it can be pointed out that the value creation component, based on the findings, has the least accuracy in forecasting based on three parameters of organizational structure, so it is contrary to Bandara research. Analysis results Verij Kazemi et al. [33] and [34] indicates the proper performance of the KVNN algorithm in predicting network frequency. The same researcher also showed that the Lazy algorithm has a good ability to predict the future with the help of data available in the past and in comparison with the present article, it confirms the proper performance of the KVNN algorithm, which is one of the most powerful types of Lazy methods in predicting entrepreneurial marketing.

In order to improve the entrepreneurial marketing situation in the insurance industry, the following can be noted in order to improve the structure: reducing vertical levels in the organizational structure, reducing the gap between branches from the head office, specialized training for forces in the areas of customer relationship, creating Freedom of action for employees in the framework of standards and regulations, review of the cumbersome rules of the organization that takes flexibility in the delivery of services, employee participation in decision making, the use of innovative ways to build and maintain relationships with customers, focus on customer satisfaction through regular measurements, Competition order, providing new services to the market based on the needs of customers through regular reviews, reviewing service prices both in the area of compulsory insurance and in the area of optional insurance, valuing the regular management process for accepting rational risk, caring for employee's useful suggestions for using a strong information system to monitor customer needs and competitive behaviors. From two perspectives, this research has some constrains. First, it is limited in space because it is only selected in the province of Mazandaran, and the application of this method is effective when the objective function is very complex but can be displayed by simpler local functions. Another limitation that can be mentioned is that if the data applied for training are low and do not have a good variety, the KVNN algorithm prediction error will increase, so usually when the questionnaire is limited, the use of this method is not recommended.

According to the above information, the researcher will make suggestions for future researchers to conduct research in this field:

- *Using neural network algorithms and deep learning to predict entrepreneurial marketing and also compare it with other existing methods.*
- *Reviewing the comparative dimensions of entrepreneurial marketing in public and private insurance.*
- *Providing a specific scale for entrepreneurial insurance marketing, investigating the relationship between organizational agility and Entrepreneurial marketing in the field of services.*
- *Especially insurance, the role of customer relationship systems in entrepreneurial marketing in the insurance industry.*
- *The effects of employing entrepreneurial marketing on the level of loyalty and commitment of insurance customers.*
- *The application of other meta-learning algorithms for prediction in entrepreneurial marketing.*

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